



REGULATORY GUIDE

NEBRASKA DEPARTMENT OF HEALTH AND HUMAN SERVICES

REGULATORY GUIDE 5.0

GUIDE FOR THE PREPARATION OF APPLICATIONS FOR THE USE OF SEALED SOURCES AND DEVICES FOR PERFORMING INDUSTRIAL RADIOGRAPHY

1. INTRODUCTION

PURPOSE OF GUIDE

The purpose of this regulatory guide is to provide assistance to applicants and licensees in preparing applications for new licenses, license amendments, and license renewals for the use of sealed sources and devices for performing industrial radiography. The term "radiography" as used in this guide means the examination of the structure of materials by nondestructive methods that use gamma-emitting radioactive material. The radioactive material most commonly used for radiography are cobalt-60 and iridium-192.

This regulatory guide is intended to provide you, the applicant and licensee, with information that will enable you to have an understanding of specific regulatory requirements and licensing policies as they apply to industrial radiography. The information in this regulatory guide is not a substitute for training in radiation safety.

After you are issued a license, you must conduct your program in accordance with (1) the statements, representations, and procedures contained in your application, (2) the terms and conditions of the license, and (3) Title 180 (Control of Radiation). The information you provide in your application should be clear, specific, and accurate.

APPLICABLE REGULATIONS

Regulations applicable to radiography are 180 NAC 10, "Notices, Instructions and Reports to Workers; Inspections"; 180 NAC 4, "Standards for Protection Against Radiation"; 180 NAC 3-011 "General Requirements for the Issuance of Specific Licenses"; other pertinent regulations are 180 NAC 3-016, through 3-022, 3-025 through 3-028, NAC 5 "Radiation Safety Requirements for Industrial Radiographic Operations"; 180 NAC 13, "Transportation of Radioactive Material"; 180 NAC 15, "Training and Experience Requirements for Use of Radiation Sources"; 180 NAC 17, "Enforcement of Radiation Control Act and Rights to Hearing

NEBRASKA DEPARTMENT OF HEALTH & HUMAN SERVICES REGULATION AND LICENSURE, REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public acceptable methods of implementing specific parts of Title 180 Nebraska regulations, "Control of Radiation", to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants, licensees, or registrants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the Nebraska Department of Health and Human Services Regulation and Licensure Department, Public Health Assurance Division, Radioactive Materials Program, to make necessary determination to issue or continue a license or certificate of registration.

Comments and suggestions for improvements in these Regulatory Guides are encouraged at all times and they will be revised, as appropriate, to accommodate comments and to reflect new information or experience. Comments should be sent to the Nebraska Department of Health and Human Services, Regulation and Licensure, Public Health Assurance Division, Radioactive Materials Program, 301 Centennial Mall South, P.O. Box 95007, Lincoln, NE 68509.

Requests for single copies of issued guides (which may be reproduced) should be made in writing to the Nebraska Department of Health and Human Services, Regulation and Licensure Department, Public Health Assurance Division, Radioactive Materials Program, 301 Centennial Mall South, P.O. Box 95007, Lincoln, NE 68509.

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Procedures for Licensees and Registrants; Penalties" and 180 NAC 18, "Fees for Certificates of Registrations, Radioactive Material(s) Licenses, Environmental Surveillance and Implementation, Emergency Planning, Emergency Response and Implementation and other Regulatory Services." It is your responsibility as an applicant and as a licensee to have copies of, to read, and to abide by each regulation. As a licensee, you are subject to all applicable provisions of the regulations as they pertain to your industrial radiographic operations.

This guide identifies the information needed to complete Form NRH-5 for applications for a license for the use of sealed sources and devices for performing industrial radiography.

2. LICENSE FEES

An application fee is required for all specific licenses and must be submitted with any NEW application. The applicant should refer to 180 NAC 18-005 to determine the amount that should accompany the application. Review of the application will not begin until the proper fee is received by the Agency. The check or money order should be made payable to the Nebraska Department of Health Regulation and Licensure.

In the case of an application for renewal or amendment, a fee should NOT be submitted with the application. All current licensees will be billed annually according to the expiration month of their current license.

3. FILING AN APPLICATION

An application for radioactive material license should be completed on Form NRH-5 provided by the Agency. Complete Items 1 through 5, and 15 on the form. For Items 6 through 14, submit additional information on supplementary pages if needed. Each separate sheet or document submitted with the application should be identified and keyed to the item number on the application to which it refers. You should complete all items in the application in sufficient detail for the Radioactive Materials Program staff to determine that your equipment, facilities, training and experience, and radiation safety program are adequate to protect health and minimize danger to life or property.

The forms should be completed in duplicate. Retain one copy for yourself, because the license will require that you possess and use radioactive material in accordance with the statements and representations in your application and in any supplements to it.

Mail the original application to Nebraska Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, Radioactive Materials Program, 301 Centennial Mall South, P.O. Box 95007, Lincoln, NE. 68509.

4. CONTENTS OF AN APPLICATION

The following comments apply to the indicated items of Form NRH-5.

Item 1(a). Applicant's Name and Mailing Address

Individuals should be designated as applicant only if they are acting in a private capacity and the use of the radioactive material is not connected with their employment with a corporation or other legal entity. Otherwise, the applicant, should be the corporation or other legal entity applying for the license.

The address specified here should be the mailing address to which correspondence should be sent. This may or may not be the same as the address at which the material will be used, as specified in Item 1(b).

Item 1(b). Locations of Use

Specify each location of storage or use by the street address, city, and State or other descriptive address (such as 3 miles west on Highway 81, Anytown, State). A Post Office Box address is not

acceptable. Also, specify whether a location is one at which operations will be conducted or whether the location is only for storage of sources and devices. If operations will be conducted at temporary job sites, specify. If a device will be used in a permanent facility or facilities, give the specific address of each if different from 1(a). NOTE: 180 NAC 5-014.01 requires a minimum of two qualified individuals be present to perform radiography at temporary job sites.

Item 2. Person to be Contacted About Application

Name the individual who knows your program and can answer questions about the application. Also, please note the telephone number at which the individual may be contacted. If the contact changes, notify the Agency. Notification of a contact change is for information only and would not be considered an application for a license amendment.

Item 3. Self-explanatory

Item 4. Individual User(s)

Specify the names of the persons who will directly supervise the use of radioactive material or who will use radioactive material without supervision.

Item 5. Individuals Responsible for Radiation Safety Program

180 NAC 5-004.01, item 6 requires submission of a description of the overall organization pertaining to the radiography program, including specific delegations of authority and responsibility for operation of the program.

Include the following information in order to comply with the regulatory requirements:

- A.** Chart or description of the organization as it pertains to the radiography program specifying the name and title of each individual who has responsibility for management or supervision of the program.
- B.** The specific training and experience of each individual responsible for the day-to-day conduct of the program. Include the specific dates of training in radiation and radiation safety and where and by whom the training was conducted. Also, include the specifics of on-the-job training, including dates, name and address of the firm, equipment used, and the date on which each individual was initially designated a radiographer.

Any individual who is responsible for the day-to-day management or supervision of the radiography program should have had a minimum of 1 year of actual experience as a radiographer. No credit for experience will be given for the use of x-ray devices.

Item 6. Radioactive Material Data

Identify each sealed source by isotope, manufacturer, and model number. Identify the radiographic exposure device in which each sealed source will be used. Identify any source changers by manufacturer and model number.

You should make sure that the sealed source/device/source changer combinations are compatible with one another. You may designate the sealed sources and source changers from more than one manufacturer if they are compatible with the particular exposure device. This information is available from the manufacturers.

Specify the maximum amount of radioactive material that will be in each named source. It is not necessary to designate the number of sources you may want to possess at any one time. It is Nebraska Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, Radioactive Materials Program practice to provide flexibility in the number of

identical sources that may be possessed at any one time.

Identify other sealed sources (i.e., any source that will not be used for performing radiography) you may wish to possess by radioisotope, manufacturer, model number, maximum amount of radioactive material in the source, and the device, if any, in which it will be used. For example, identify a sealed source and device that will be used for instrument calibration.

Because of the large area that requires surveillance, sources that exceed 200 curies of iridium-192 and 100 curies of cobalt-60 will not be routinely approved for temporary job site use. Sources that exceed these amounts should be used in shielded permanent facilities. If you wish to use sources in excess of 100 curies of cobalt-60 or 200 curies of iridium-192 at temporary job sites, you should provide specific information concerning where the sources will be used, the conditions of use, and how you will conduct surveillance to prevent entry into the restricted area. Your operating and emergency procedures (see Section 13.4 of this guide) should provide special instructions governing the use of such sources with particular emphasis on area surveillance.

Specify the purpose for which the radioactive material will be used, e.g., industrial radiography, source exchange, or instrument calibration.

Items 7 and 8. Training and Experience

Radiographer's Assistant

For an individual without previous training and experience to be designated as a radiographer's assistant, as per 180 NAC 5-016.03, the individual must have:

- Received copies of and instructions in the requirements described in the regulations contained in 180 NAC 5 and applicable 180 NAC 4, 10, and 13, in the license that the radiographer's assistant will perform industrial radiography, and in the operation and emergency procedures;
- Demonstrated an understanding in the above topics by successful completion of a written or oral examination;
- Received training, under the supervision of a radiographer, in the use of radiographic exposure device and sealed source, in the daily inspection of devices and associated equipment, and the use of radiation survey instruments; AND
- Demonstrated understanding of the use of the equipment described above by a successful completion of a practical examination.

Radiographer

For an individual to be designated as a radiographer, the individual must have the following training and experience as per 180 NAC 5-016.01, the individual must have:

- They must have received at least 40 hours of training in the subjects outlined in 180 NAC 5-016.07;
- Be certified through a radiographer certification program by a certifying entity;
- Have on the job training consisting of hands-on-experience under the supervision of a radiographer. The on the job training shall include a minimum of 2 months (320) hours of active participation in the performance of industrial radiography utilizing radioactive material and/or 1 month (160) hours of active participation in the performance of industrial radiography utilizing radiation machines. Individuals performing industrial radiography utilizing radioactive materials and radiation machines must complete both segments of the on the job training (3 months or 480 hours); AND
- Complete the training for radiographers' assistants.

The instruction in your operating and emergency procedures should be conducted in a classroom and should be approximately 4 to 6 hours in length. The instruction in the use of equipment should be 2 to 4 hours in length and sufficient to enable the individual to operate the equipment in the presence of

a radiographer while actually performing radiography.

For an individual who has been a radiographer for another licensee, it is your responsibility to determine the individual's competence to act as a radiographer for you. As a minimum, the individual must receive formal instruction similar to that given to prospective radiographers' assistants, that is, instruction in your operating and emergency procedures and in the use of your equipment. The individual must be given the written and field examinations for designation as a radiographer.

The person who instructs individuals in the principles of radiation and radiation safety should have knowledge and understanding of the principles beyond that obtainable in a course similar to the one given to prospective radiographers. Individuals who provide instruction in the use of equipment should be qualified radiographers with at least 1 year of experience in performing radiography. The name of each individual who will conduct training and the topics in which they will provide instruction should be specified.

Instructions in the radiation safety matters in 180 NAC 5-016-07 may be given by a person other than the applicant or may be conducted "in-house."

Periodic training should be conducted at least annually. The periodic training should provide a review of radiation safety principles, regulations, your procedures, and your company policies with respect to radiation safety practices and a discussion of any new regulations or requirements.

Submit as part of your application, of a schedule or description of the program for training radiographers and radiographer's assistants. 180 NAC 5-016 provides further information concerning requirements for permitting individuals to act as radiographers and radiographers' assistants.

You should submit the following:

- A.** An outline of the training and instruction to be given to prospective radiographers' assistants and a copy of a typical examination (approximately 25 questions). Submit copies of the correct answers to the examination questions, note the passing grade, and describe the reinstruction to be given in areas that individuals are found to be deficient.
- B.** An outline of the course (including the topics in 180 NAC 5-016.07) given to prospective radiographers. Specify the time to be spent on each topic. Specifically identify the course by course title and instructor or firm if conducted by someone outside your organization. Identify the topics not covered in an outside course and the time spent by your instructor on the identified topics. Submit a copy of a typical examination together with the correct answers to the examination questions, note the passing grade, and describe the reinstruction to be given in areas in which individuals are found to be deficient.
- C.** A description of the field (practical) examination that will be given to prospective radiographers and radiographer's assistants. The examination should be a practical demonstration of knowledge of and ability to perform radiography and related tasks in compliance with your operating and emergency procedures and Nebraska Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, Radioactive Materials Program regulatory requirements.
- D.** An outline of the instructions given to individuals with previous radiography training and a description of the examination.
- E.** A commitment that on-the-job training will be for a minimum of 2 months full-time equivalent. This means approximately 320 hours of actual work performing radiography and associated operations.
- F.** A discussion of periodic training, including frequency and by whom the periodic training will be conducted.

- G. Identification of individuals who will instruct and train prospective radiographers and radiographer's assistants. Submit specific information about the qualifications of these individuals, including where, when, and by whom they were trained in the principles of radiation and radiation safety and in the actual performance of radiography. X-ray training will not be considered adequate experience for performing gamma radiography. Previous experience must have been in performing radiography with gamma-emitting sealed sources.

Item 9 and 10. Radiation Detection Instruments and Calibration of Instruments

180 NAC 5-008 requires that a licensee maintain sufficient calibrated and operable survey meters to make physical radiation surveys as required by 180 NAC 4 and 5, that the instruments have a range sufficient to measure 2 milliroentgens per hour through 1 roentgen per hour, and that the instruments be calibrated at intervals not to exceed 6 months and after each instrument repair.

State that you will have operable and calibrated survey meters with a range from 2 milliroentgens per hour through 1 roentgen per hour. Include a statement that the meters will (1) be calibrated so that the readings are $\pm 20\%$ of the actual values of the range of the instrument, (2) have a calibration chart or graph showing the results of the calibration, the date of the last calibration, and the due date of the next calibration affixed to the survey meter, and (3) be calibrated at least every 6 months or after each servicing. Also state that calibration records will be kept for a minimum of three years after each calibration and identify by whom the instruments will be calibrated. If calibration is performed by a person or firm outside your organization, identify each person or firm by name and NRC or Agreement State license number.

For detailed information about survey instrument calibration, refer to ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration."¹

Item 11. Personnel Monitoring Devices

180 NAC 5-019 requires that radiographers and radiographers' assistants wear direct-reading pocket dosimeters, an alarm ratemeter and either film badges, thermoluminescent dosimeters (TLD's) or optically stimulated luminescent dosimeter (OSLD) during radiographic operations, except that for permanent radiography facilities where other appropriate alarming devices are in routine use, the wearing of an alarming ratemeter is not required. The pocket dosimeters must have a range from 0 to at least 200 milliroentgens. The use of dosimeters with a range greater than 200 milliroentgens is acceptable only if more than one dosimeter is worn and at least one of the dosimeters has a range of 0 to 200 milliroentgens.

The only information needed in your application is a statement that the required personnel monitoring equipment, including 0 to 200 milliroentgen dosimeters, will be used by radiographic personnel. State your maximum time for the exchange is monthly for film badges and quarterly for TLD's and OSLD's.

Item 12. Facilities and Equipment

180 NAC 3-011, item 2 states that an application will be approved if, among other things, the applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property.

A permanent radiographic installation is at a fixed location, is shielded so that the area outside the

¹Copies may be obtained from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

facility is an unrestricted area, and is not under continuous surveillance. The facility may be used only occasionally for performance of radiography, but it should be considered a permanent facility because it is the nature of the facility rather than the frequency of use that determines whether the facility is a permanent radiographic facility.

If you intend to perform radiography in a permanent radiography facility or facilities, provide the following information for each facility:

- A.** An annotated sketch or drawing of the facility and its surroundings that shows:
- . The scale to which the sketch or drawing is made (the same scale should be used for all sketches and drawings.) The recommended scale is 1/4 inch = 1 foot.
 - . The type, thickness, and density of shielding materials on all sides, including the floor and roof.
 - . The locations of entranceways and other points of access into the facility.
 - . A description of the nature of the areas adjacent to the facility and the distance to these areas. Include information on areas adjacent to, above, and below the facility.

- B.** A description of the visible-audible signal system, its location, and how it meets the requirements in 180 NAC 5-012. The visible signal must be activated by radiation whenever the source is exposed, and the audible signal must be activated when an attempt is made to enter the facility when the source is exposed. The requirement for the visible-audible signal system is in addition to such other measures that may be taken to prevent access into the facility as locked doors.

180 NAC 4-023 provides an alternative to the visible-audible alarm system required by 180 NAC 5-012. It is acceptable to use a system that will reduce the radiation level if the entrance to a high radiation area is opened while a source is out of its safe storage condition. The system must be automatic and may not depend on action by radiography personnel. If you intend to use this alternative, provide a description of your system.

- C.** The results of radiation level calculations or actual radiation measurements adjacent to, above, and below the facility. The radiation level in all directions around the facility, including the roof, should not exceed 2 milliroentgens per hour. Clearly identify the type of source (isotope), the amount of radioactive material in the source, and the position of the source within the facility for the calculations or measurements.

Variances will be considered if construction requirements preclude shielding the roof to meet the 2-milliroentgen per hour radiation level. Provide the following information to obtain approval for a variance:

- . Means of access to the roof.
- . Procedures for ensuring that no individual is on the roof or could gain access to the roof during the performance of radiography.
- . A commitment that the roof will be posted with "Caution (or Danger) Radiation Area" signs.
- . The steps taken to minimize radiation on the roof.

A radiation level that exceeds 100 milliroentgens per hour will not be considered acceptable. This radiation level constitutes a high radiation area and requires special

precautions such as the visible-audible signal system required by 180 NAC 5-012.

- D. Limitations (if needed) on positioning of source, or type (isotope) and amount of radioactive material that may be used in the facility to ensure that areas adjacent to, above, and below the facility will be unrestricted areas during the performance of radiography.

Item 13. Radiation Protection Program

A. Internal Inspection Program

An internal inspection program adequate to ensure that State of Nebraska Health and Human Services Regulation and Licensure regulations, license provisions, and your operating and emergency procedures are followed by radiographers and radiographers' assistants is recommended by the Public Health Assurance Division. You should submit a description of your internal inspection program that includes the specific matters to be considered in an inspection and a discussion of management action to be taken to correct any deficiencies. Your internal inspection program must cover each radiographer and radiographer's assistant at intervals not to exceed 6 months. Include such a commitment in your application.

Inspections should be made on the job and should, insofar as possible, be unannounced.

If a radiographer or radiographer's assistant does not perform radiography for a period that exceeds 6 months, the inspection should be carried out the first time that person engages in radiographic operations.

Specify the name, training, and experience of each individual who will conduct internal inspections. An individual who conducts internal inspections should have a minimum of one year of actual experience as a radiographer.

Exhibit 1, Internal Inspection Checklist, provides an example of an acceptable internal inspection. Your internal inspection checklist should be tailored to your program.

EXHIBIT 1

Field Radiography

Internal Inspection Checklist

Radiographic Location _____ Date _____ Time _____

1st Radiographer _____ Inspector _____

2nd Radiographer or Assistant _____

Radioisotope _____ Curies _____ Serial No. _____

Projector Serial No. _____ Projector Model No. _____

Survey Meter Model No. _____ Serial No. _____ Cal. Due Date _____

YES

NO

1. Were the radiographers wearing a film badge and dosimeter?
2. Were other individuals working within the restricted area wearing film badges and dosimeters?
3. Was the restricted area posted with "CAUTION (or DANGER) RADIATION AREA" signs?
4. Was the restricted area properly controlled to prevent unauthorized entry?
5. Was the high radiation area posted with "CAUTION (or DANGER) HIGH RADIATION AREA" signs?
6. Did the radiographers have a calibrated and properly operating survey meter?
7. Was the utilization log properly filled out?
8. Did the radiographers have sufficient knowledge of safety rules? (Ascertained by oral questions.)
9. Were the radiographers working with defective equipment?
10. Did the radiographers properly survey the source projector and source tube and take a radiation reading 1 foot (0.3 m) in front of the source following the radiographic

exposure?

EXHIBIT 1, Continued

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 11. Were radioactive isotopes stored properly and kept locked to prevent unauthorized removal? | | |
| 12. Was the storage area posted with "CAUTION (or DANGER) RADIOACTIVE MATERIAL" signs? | | |
| 13. Did the radiographers possess a copy of the applicant's operating and emergency procedures and, as applicable, Title 180 or NRC rules and regulations for protection against radiation? | | |
| 14. Were there any items of noncompliance other than those listed on this form? (If any, explain in remarks.) | | |

Remarks _____

B. Operating and Emergency Procedures

Operating and emergency procedures shall be established and submitted to the Public Health Assurance Division as part of your application. In addition, if radiographers will perform other operations such as source exchange, leak-testing, and quarterly inspection and maintenance of equipment, appropriate procedures and instructions for these operations should be included in your operating and emergency procedures.

The purpose of operating and emergency procedures is to provide radiography personnel with clear and specific guidance and instruction for all operations they will perform. The topics that should be included in the operating and emergency procedures are not in any specific order of importance. A sequential set of procedures and instructions from the beginning to the end of the workday is an acceptable format. Instructions for nonroutine operations, for example, quarterly inspection and maintenance, may be included as appendices.

180 NAC 5-017 lists the topics that need to be covered in your operating and emergency procedures.

(1) Handling and Use of Sealed Sources and Radiography Exposure Devices.

Provide step-by-step instructions for using each type of radiographic device. Instructions for "crankout" devices should be separate from those for "pipeliner" devices. Manufacturers' manuals and similar documents may not be incorporated into the procedures; rather, information should be extracted from them.

(2) Methods and Occasions for Conducting Radiation Surveys.

The following are examples of surveys you will need to make during radiography and associated operations:

- (a)** Determining the boundary of the restricted area.
- (b)** Determining that the source has returned to the safe storage position after each radiographic exposure.
- (c)** Determining the radiation levels at external surfaces of storage facilities, including vehicles used for storage.
- (d)** Determining the radiation levels in and around vehicles used for transporting sources and devices.
- (e)** Determining that radiation levels around containers prepared for shipment comply with Department of Transportation regulations.
- (f)** Determining that sources are in safe storage position following source exchange and that radiation levels around source changers meet regulatory requirements.

These surveys will be discussed in more detail under the appropriate topics. In general, surveys need to be made whenever a source is manipulated or moved.

(3) Methods for Controlling Access to Radiographic Areas.

180 NAC 4-032 requires posting of radiation areas and high radiation areas.

For temporary job site radiography, it is acceptable to post the perimeter of the restricted area rather than the perimeter of the radiation area. Instruct personnel to post "Caution (or Danger) Radiation Area" signs at the calculated 5 milliroentgens in any one hour radiation level and to make a confirming survey after the source has been exposed.

The perimeter of the high radiation area must be posted with "Caution (or Danger) High Radiation Area" signs at the calculated 100 milliroentgens in any one hour radiation level. Do not include instructions for a confirming survey of the high radiation area perimeter, since such a survey could lead to unnecessary exposure of personnel.

For permanent radiographic installations, provide instructions to personnel about posting the entrance to the facility with "Caution (or Danger) High Radiation Area" signs and provide procedures to ensure that the visible-audible signal system is operable.

180 NAC 5-021 requires direct surveillance to protect against unauthorized entry into a high radiation area except where the high radiation area is equipped with a control device or alarm system or where the high radiation area is locked to protect against unauthorized or accidental entry.

For radiography in nonpermanent facilities, instruct personnel to keep the perimeter of the restricted area under continuous surveillance. Specify steps to take in the event that unauthorized personnel enter the restricted area, for example, immediate termination of the radiographic exposure. Surveillance of the perimeter of the restricted area will protect against entry into the high radiation area and prevent unnecessary exposure of individuals.

(4) Methods and Occasions for Locking and Securing Radiographic Exposure Devices, Storage Containers, and Sealed Sources.

180 NAC 5-007 requires that locked radiographic exposure devices and storage containers be physically secured to prevent tampering or removal by unauthorized personnel. It is not acceptable to chain or secure to a fence or post. Unless a radiographer or radiographer's assistant is physically present to maintain surveillance, a device containing a source should be placed in storage so that it is not accessible to unauthorized persons.

There may be situations in which radiography is performed in such a location that it would take extraordinary effort to gain access to the device, e.g., at the top of a building under construction. In anticipation of such situations, provide specific procedures for an alternative method of securing the device and the circumstances for the alternative method. Keep in mind that roping an area and posting signs do not constitute an acceptable alternative.

The storage facility should be such that the area around it is an unrestricted area (no more than 2 milliroentgens per hour at 18 inches (45 cm) from any surface); the facility should be posted with "Caution (or Danger) Radioactive Material" signs. A physical survey should be performed to confirm that the area around the storage facility is an unrestricted area.

180 NAC 5-007.01 requires that devices be secured in the shielded position each

time the source is returned to that position. The procedures for using the devices must require locking the device at the end of each exposure. A radiation survey must be performed to confirm that the source is in the safe shielded position. For crankout devices, the survey must include the guide tube and the device itself.

(5) Personnel Monitoring and the Use of Personnel Monitoring Equipment.

180 NAC 5-019 states that no individual may act as a radiographer or radiographer's assistant unless, at all times during radiographic operations, that person wears a direct-reading pocket dosimeter, an alarm ratemeter and either a film badge, thermoluminescent dosimeter (TLD) or optically stimulated luminescent dosimeter (OLLD), except that for permanent radiography facilities where other appropriate alarming devices are in routine use, the wearing of an alarming ratemeter is not required. Personnel should be instructed that they are required to wear direct-reading pocket dosimeters, film badges, TLDs, optically stimulated luminescent dosimeter (OLLD) when they are engaged in radiographic operations. Personnel should be instructed to charge their pocket dosimeters at the start of each workday so that the dosimeters are capable of reading full scale. The dosimeter reading must be recorded at the beginning and end of each workday.

Include instructions about how and where dosimetry devices are to be stored when not in use. The storage place should be dry, radiation free, and cool so that devices will not be affected by adverse environmental conditions.

(6) Transporting Sealed Sources to Field Locations, Securing Exposure Devices and Storage Containers in Vehicles, Posting of Vehicles, and Control of Sealed Sources During Transportation.

180 NAC 13-005 requires that transport of radioactive material be carried out in accordance with the applicable requirements of the Department of Transportation. Consult the Department of Transportation's (DOT's) regulations for detailed information about transportation requirements. Instructions to personnel should not reference DOT requirements. Information should be extracted and placed into the instructions so that personnel know exactly what they are expected to do. The following items should be covered in instructions to personnel:

- (a)** Labeling containers with the appropriate label as specified in 172.403 of 49 CFR Part 172 of the DOT's regulations, i.e., instruction on how to determine which label (Radioactive White I, Radioactive Yellow II, or Radioactive Yellow III) must be used.
- (b)** Securing the exposure device or storage container within the transporting vehicle. The instructions should specify how the package is to be secured in the vehicle so that it cannot move during transport.
- (c)** Placarding both sides, the front, and the back of the vehicle with "RADIOACTIVE" placards if the package being transported requires a Radioactive Yellow III label. Sections 172.519 and 172.556 of 49 CFR Part 172 of the DOT's regulations contain the requirements for the placards.
- (d)** Surveying the exterior surfaces and passenger compartment of the vehicle to ensure that the radiation levels do not exceed 2 milliroentgens per hour at 18 inches (45 cm) from any exterior surface and 2 milliroentgens per hour in the passenger compartment. Include instructions to personnel on

the measures that should be taken if the radiation level exceeds 2 milliroentgens per hour in the passenger compartment. For example, instruct them to add more shielding or reposition the device within the vehicle.

A vehicle used for transport could also be used for storage at a temporary job site. If the vehicle will be used for storage, there should be instructions to personnel about proper posting of the vehicle. The RADIOACTIVE placards that would be on the vehicle if a package with a Radioactive Yellow III label were transported should be removed and "Caution - Radioactive Material" signs should be substituted. The radiation level may not exceed 2 milliroentgens per hour at 18 inches (45 cm) from any external surface of the vehicle. The vehicle should, of course, be locked when it is used for storage.

(7) Minimizing Exposure of Persons in the Event of an Accident - Emergency Procedures.

An emergency situation is considered to exist whenever an abnormal event occurs, e.g., failure of a source to return to the safe storage position. Since it is not possible to list or specify all possible situations that would constitute an emergency, a general instruction is acceptable.

Radiography personnel should not attempt to perform operations involving retrieval or recovery of a source not in the shielded position unless they have had specific instruction and actual practice in retrieval operations with a dummy source. If you intend that radiographic personnel perform source retrieval or recovery, include in your training program a description of the instruction they will receive, including practice with a dummy source. In addition, include specific instructions for source retrieval in your operating and emergency procedures.

Unless personnel have had instruction and training in source retrieval or recovery, include the following instructions to personnel:

- (a)** Establish and post the restricted area at the 2 milliroentgens per hour radiation level.
- (b)** Maintain continuous surveillance of the restricted area until the situation is corrected.
- (c)** Notify management or other appropriate persons.

In addition, describe the action to be taken by management.

(8) Notification of Proper Persons in the Event of an Accident.

In the emergency procedures, clearly identify the names and telephone numbers of management or supervisory personnel to be notified in the event of an accident as required by 180 NAC 5-017.01, item 10. The individuals to be notified should be those persons who are in a position to take appropriate action in an emergency or accident. Such persons could also include those in police and fire departments, depending on the emergency.

(9) Maintenance of Records.

When you are granted a license, you must generate and maintain certain records. Among these are records generated by radiography personnel during the performance of radiography, including:

- (a)** Utilization logs are required by 180 NAC 5-028. The instructions to personnel should clearly specify the need for the utilization log. The elements required are:
 - (i)** The make, model number and serial number of the device used.
 - (ii)** Identification of the radiographer.
 - (iii)** Where the device is used and the date.
- (b)** Records of daily inspection of equipment as required by 180 NAC 5-029. Instructions to personnel should specify that a record be made of the daily inspection.
- (c)** Pocket dosimeter readings as required by 180 NAC 5-019. These readings should be made at the beginning and end of a work shift. Instructions to personnel must specify that the readings be recorded.
- (d)** Results of the physical survey following the final exposure of the day or operation as required by 180 NAC 5-020. Instructions to personnel should specify that a record of the final survey be made.

There may be other operations performed by radiography personnel for which records should be generated. These operations may include quarterly inspection and maintenance, instrument calibration, shipment of packages, etc. If management requires radiographers to perform operations associated with the performance of radiography, the instructions dealing with these operations should include instruction for an appropriate record of the performance of the operation.

Do not include instructions about records that are the responsibility of management and supervisors.

(10) Daily Inspection and Maintenance of Exposure Devices and Storage Containers.

180 NAC 5-011.01 requires that the radiographic exposure devices, storage containers, and source changers be checked for obvious defects prior to use each day the equipment is used.

The instructions to personnel must clearly reflect the regulatory requirement that the daily inspection be performed each day before the equipment is used. If equipment is used on more than one shift during a day, the equipment should be checked at the start of each shift.

Specify in the instructions to personnel the items that must be checked and the steps to be taken if any defects are found in the equipment. Manufacturers of the equipment can provide a list of items that should be checked in the daily inspection. A record of the performance of the daily inspection should be made.

Exhibit 2 provides examples of instructions for daily inspection of radiographic devices. Your instructions should be tailored to your program and to the devices you wish to possess and use.

(11) Off-Scale Pocket Dosimeter Readings.

180 NAC 5-019.04 requires that an individual's film badge, TLD or OLLD be immediately sent for processing if the self-reading pocket dosimeter is found to

be off scale. There are no exceptions to this requirement. Regardless of the circumstances, the film badge, TLD or OLLD must be sent for processing if the pocket dosimeter is found to be off scale during or at the end of the work shift of the person who was wearing the dosimeter.

Instructions to personnel for action to be taken if a dosimeter is found to be off scale should, as a minimum, include the following:

- (a)** Stop work immediately and place the source in the safe storage position in the exposure device.
- (b)** Notify the individual specified in the emergency procedures.

EXHIBIT 2

Daily Maintenance Check of Radiographic Device

The radiographer will perform a daily maintenance check of the exposure device and related radiographic equipment. This inspection will be conducted prior to the use of the equipment on each day that radiographic work is to be performed. Report defective equipment to the RSO immediately. Do not attempt to use defective equipment. After determining that the equipment is operative, record the condition of the radiographic equipment.

1. Inspect the remote-control radiographic equipment as follows:
 - . Inspect the cables for cuts, break, and broken fittings.
 - . Inspect the crank for damage and loose hardware.
 - . Check operation of the control for freedom of drive cable movement.
 - . Inspect the guide tube for cuts, crimps, and broken fittings.
 - . Survey for radiation levels and record readings. The radiation levels should be about the same as those in previous daily inspections.
 - . Check that all safety plugs are in place.
 - . Inspect the exposure device for damage to fittings, lock, fasteners, and labels.
 - . Check for any impairment of the locking mechanism.
 - . Record the results of the daily inspection in the log.
2. Inspect a typical pipeliner device as follows:
 - a. Source Shield Assembly

Make a radiation survey of exterior surfaces of the source shield assembly. With the center of the survey meter 6 inches (15 cm) from the surface, the radiation levels should not exceed 0.25 milliroentgen per hour per curie. Example: 80 curies x 0.25 = 20 mR/hr.

Visually inspect for signs of damage. Check the fastenings on the actuator. Look for missing or loose fasteners. Check to ensure the safety wiring on the fasteners is intact. Check the nameplate bearing the radiation symbol for presence and legibility. Check that the lock is operable.
 - b. Control Assembly

Visually check for damage. Test for leaks by turning the control valve to OFF. Pump a vacuum of approximately 15 inches and observe the gauge.

The gauge should remain steady. A falling gauge indicates a leak. A leaking control assembly must be repaired.

EXHIBIT 2, continued

c. System Check

Conduct the check in an area where the source may be exposed. Position the source shield assembly so that the beam is directed away from you and preferably into a shielding wall or floor. Place a survey meter turned ON adjacent to the projector so you can observe it.

Connect the tube to the source shield assembly.

Lock the projector.

Connect the tube to the control assembly.

Set the control valve to OFF

Pump vacuum to approximately 15 inches.

Turn the control to ON. Observe your survey meter. The radiation level should not change. If the radiation level increases, the lock is faulty and must be repaired.

Observe the vacuum gauge. A falling gauge indicates a leak in the control hose or source actuator.

Turn the control to OFF.

Remove the hose from the source shield assembly.

IMPORTANT: Be sure the control valve is turned OFF. Be sure the hose is removed from the source shield assembly before unlocking.

Unlock the projector.

Replace the hose in the source shield assembly.

Turn the pump control valve on ON. Observe your survey meter. The radiation level should increase. Turn the control valve to OFF. The radiation level should decrease to initial level.

Record the results of the daily inspection in the log.

(12) Procedure for Identifying and Reporting Defects and Noncompliance.

If radiography personnel discover any malfunction or defect in radiography equipment, management should be notified so that it can take appropriate action. Instructions to personnel should require management notification if equipment malfunctions or defects are found.

(13) Other Tasks

As indicated earlier in this guide, radiography personnel may be assigned responsibility for carrying out other operations such as source exchange, quarterly inspection and maintenance of equipment, and leak-testing. If radiography personnel are assigned such tasks, specific instructions for performance of the tasks should be included in the operating and emergency procedures.

C. Leak-Testing

180 NAC 5-009 contains the requirements for leak-testing sealed sources. The options for leak-testing are:

- (1)** Engage the services of a consultant or commercial facility to take samples, evaluate the samples, and report the results to you.
- (2)** Use a commercial leak-test kit. You take the smear and send the smear to the kit supplier, who reports the results to you.
- (3)** You perform the entire leak-test sequence, including taking the smears and measurement.

For Option (1), specify the name, address, and license number of the consultant or commercial organization.

For Option (2), specify the kit model number and the name, address, and license number of the kit supplier. If the sample will be taken by individuals in your organization who have management or supervisory responsibilities, the names of the individuals should be specified. If radiographers will take the test sample, include instructions for taking the sample in your operating and emergency procedures. Include in the instructions a requirement that any indication of possible source leakage should be reported to management for appropriate action.

For Option (3), specify how and by whom the test sample will be taken, the instrumentation that will be used for measurement, and the individual who will make the measurement and his or her qualifications. An instrument capable of making quantitative measures should be used. Hand-held survey meters will not normally be considered adequate for measurements. A sample calculation for conversion of the measurement data to microcuries should be included.

Item 14. WASTE MANAGEMENT

The disposal of radioactive material must satisfy the general requirements stated in 180 NAC 4-037. 180 NAC 4-037.01 requires the radioactive material contained in radiographic devices to be disposed of by transfer to an authorized recipient. Authorized recipients are the original supplier, a commercial firm licensed by the NRC or an Agreement State to accept radioactive waste from other persons, or another specific licensee authorized to possess the radioactive material. Specify how you will dispose of radioactive material.

Item 15. CERTIFICATION

Your application should be dated and signed by a representative of the corporation or legal entity who is authorized to sign official documents and to certify that the application contains information that is true and correct to the best of your knowledge and belief. Unsigned applications will be returned for proper signature.

5. AMENDMENTS TO A LICENSE

After you are issued a license, you must conduct your program in accordance with (1) the statements, representations, and procedures contained in your application, (2) the terms and conditions of the license, and (3) Title 180.

It is your obligation to keep your license current. You should anticipate the need for a license amendment insofar as possible. If any of the information provided in your application is to be modified or changed, submit an application for license amendment. In the meantime, you must comply with the terms and conditions of the license until it is actually amended; you may not implement changes on the basis of a submission requesting an amendment to your license.

Examples of the more common amendments to licenses for industrial radiography include:

- A.** Addition of a new source/device/source changer combination.
- B.** Change in your organizational structure., e.g., persons responsible for the conduct of the radiography program.
- C.** Addition of a new location of use or storage.

For example, if you wish to add a new source/device/source changer combination, you should review your operating and emergency procedures to ensure that changes are made to accommodate the new equipment, including instructions for use and daily inspection. Quarterly inspection and maintenance and leak-testing need to be considered.

Similarly, in your application for a license amendment, you should consider the impact that the change will have on other documents. Any necessary modification of documents or procedures should be submitted so that additional correspondence will not be necessary.

An application for a license amendment may be submitted either on the application form (NRH-5) or in letter form and sent to the address specified in this guide in Section 3, "Filing An Application." Your application or letter should identify your license by number and should clearly describe the exact nature of the changes, additions, or deletions. You should make clear and specific references to previously submitted information and documents, and should identify the pertinent information by date, page, and paragraph. For example, if you wish to make a change in the individual responsible for your radiation safety program, your application for a license amendment should not only specify the name of the new individual but also include his or her training and experience. Moreover, the qualifications for the new individual should be equivalent to those specified in Items 7 and 8 of this regulatory guide.

6. RENEWAL OF A LICENSE

Licenses are issued for a period of up to 5 years. You should send an application for renewal to the address specified in this guide in Section 3, "Filing An Application." You may be required to submit an entirely new application for renewal as if it were an application for a new license without referring to previously submitted information.

As an alternative, you may be permitted to:

- A.** Review your current license to determine whether the information concerning your sealed sources, radiographic devices, etc., accurately represents your current and anticipated program. Identify any additions, deletions, or other changes and then prepare information appropriate for the required changes.
- B.** Review the documents you have submitted in the past to determine whether the information in them is up to date and accurately represents your facilities, equipment, personnel, radiation safety procedures, locations of use, and so on. The documents you consider to represent your current program should be identified by date. Any out-of-date or superseded documents should also be identified, and changes should be made in the documents, as necessary, to reflect your current program.
- C.** Review Title 180 NAC to ensure that any changes in the regulations are appropriately covered in your program description.
- D.** After you have completed your review, submit a letter to Nebraska Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, Radioactive Materials Program, requesting renewal of your license and providing the information specified in Items 1, 2, and 3, as necessary.
- E.** Include the name and telephone number of the person who may be contacted about your renewal application and include your current mailing address if it is not stated correctly on your license.

If your application for renewal is filed at least 30 days before the expiration date of the license, your license will automatically remain in effect until the Agency takes final action on the application. However, if your application is filed less than 30 days before the expiration date and the Agency cannot process it before that date, you would be without a valid license when your license expires.

If you do not wish to renew your license, you must dispose of all radioactive material you possess in a manner authorized by 180 NAC 4 and send a notification of disposition of the materials to the Agency before the expiration date of your license with a request that your license be terminated. If all the radioactive material in your possession cannot be disposed of before the expiration date, a license renewal should be requested for storage only of the radioactive material in order to avoid violating the requirement that you may not possess licensable material without a valid license.